

SPECIFICATION

TITLE OF THE INVENTION

FONT SHARING SYSTEM AND METHOD, AND RECORDING MEDIUM  
STORING PROGRAM FOR EXECUTING FONT SHARING METHOD

5                   BACKGROUND OF THE INVENTION

Field of the Invention

          This invention relates to a system and method in  
which fonts are shared by a client computer and server  
capable of performing data communication with each  
10 other, a recording medium storing a program for  
executing a font sharing method, a client computer  
constructing a system in which fonts are shared, and a  
method of controlling the operation thereof.

Description of the Related Art

15           In a case where data is communicated between a  
client computer and a server and text is displayed or  
printed, three methods of displaying or printing  
characters having specific fonts are available.

          Specifically, the first method includes  
20 transmitting data representing a character as well as  
data such as a name specifying the a character font from  
the client computer to the server and having the server  
display and/or print the a character having the font.  
Alternatively, the method includes transmitting the data  
25 representing a character as well as data such as a name  
specifying the a character font from the server to the  
client computer and having the client computer display  
and/or print the a character having the font.

The second method includes transmitting outline information from the client computer to the server and having the server display, for example, a character having an outline in accordance with the outline information, or transmitting outline information from the server to the client computer and having the client computer display, for example, a character having an outline in accordance with outline information.

The third method includes transmitting bitmap image data from the client computer to the server and having the server display, for example, a character based upon the bitmap image data, or transmitting bitmap image data from the server to the client computer and having the client computer display, for example, a character based upon the bitmap image data.

The first method is not appropriate for the current trend toward use of multiple platforms. The second method sends and receives outline information and therefore makes it difficult to protect any copyright that a font might possess. The third method sends and receives bitmap image data and therefore involves difficulty in terms of performing editing using the character. Since a large quantity of data is involved, moreover, communication cost is comparatively high.

There are also systems in which one host computer and a plurality of client computers are connected by a network and outline information for an outline font is transmitted from the host computer to the client

computers in response to a transmission request.  
However, since the outline font depends upon the  
operating system, font type and character codes, etc.,  
this arrangement is not very suitable for cases where  
5 foreign-language text is displayed or printed.

#### SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is  
to make it possible for fonts to be shared by a client  
computer and server in an efficient manner.

10 A font sharing system according to the present  
invention is one in which data can be communicated  
between a client computer and a server. The client  
computer has means (a transmitting device) for  
transmitting character specifying data, which specifies  
15 a character, and font specifying data, which specifies  
the font of the character, to the server. The server  
includes first character image data storage means (a  
first character image data storage device) storing  
character image data expressing a character as an image;  
20 receiving means (a receiving device) for receiving the  
character specifying data and the font specifying data  
transmitted from the client computer; retrieval means (a  
retrieval device) for retrieving, from the first  
character image data storage means, character image data  
25 expressing a character, which has been specified by the  
character specifying data received by the receiving  
means, as an image in such a manner that the specified  
character will have a font specified by the font

specifying data received by the receiving means;  
character image data generating means (a character image  
data generating device) for generating the character  
image data in response to a situation where the  
5 character image data cannot be found in the first  
character image data storage means by retrieval  
performed by the retrieval means; and character image  
data transmitting means (a character image data  
transmitting device) for transmitting, to the client  
10 computer, character image data generated in the  
character image data generating means or character image  
data found by retrieval by the retrieval means.

The present invention provides also a method suited  
to the above-described system. Specifically, the  
15 present invention provides a font sharing method in a  
system in which data can be communicated between a  
client computer and a server, comprising the steps of  
transmitting character specifying data, which specifies  
a character, and font specifying data, which specifies a  
20 font of the character, from the client computer to the  
server; receiving the character specifying data and the  
font specifying data at the server; retrieving, at the  
server, character image data expressing a character,  
which has been specified by the received character  
25 specifying data, as an image in such a manner that the  
specified character will have a font specified by the  
received font specifying data; transmitting the  
character image data that has been found from the server

to the client computer; and, in response to a situation where the character image data is not found, generating the character image data and transmitting the generated character image data from the server to the client  
5 computer.

In accordance with the present invention, the character specifying data and the font specifying data is transmitted from the client computer to the server. When the character specifying data and the font  
10 specifying data is received by the server, the server retrieves character image data representing a character specified by the character specifying data and possessing a font specified by the font specifying data.

If the character image data cannot be found by  
15 retrieval, the character image data is generated and the generated character image data is transmitted from the server to the client computer. If the character image data is found by retrieval, the found character image data is transmitted from the server to the client  
20 computer.

In accordance with the present invention, the character image data is transmitted from the server to the client computer. Even if the operating system of the client computer is different from that of the  
25 server, the character of a font that same as the font of a character represented by character image data generated by the server or character image data found by the server can be obtained at the client computer. In

5 It is preferred that the client computer have means  
for transmitting, to the server, size designating data  
representing the size of a character specified by the  
character specifying data, and that the retrieval means  
of the server retrieves, from the first character image  
0 data storage means, character image data expressing a  
character, which has been specified by the character  
specifying data and has a size that has been designated  
by the size designating data, as an image in such a  
manner that the specified character will have a font  
5 specified by the font specifying data.

The client computer may have display control means (a display controller) for controlling a display device in such a manner that a frame of having the size of character represented based upon the size designating data will be displayed on a display screen.

The client computer further includes second character image data storage means (a second character image data storage device) for storing character image

data representing a character as an image; determination means (a determination device) for determining whether character image data expressing a character as an image has been stored in the second character image data storage means, wherein this character has been specified by the character specifying data, has a font that has been specified by the font specifying data and a size that has been designated by the size designating data; and enlarging/reducing means (an enlarging/reducing device) which, in response to a determination by the determination means to the effect that the character image data has not been stored in the second character image data storage means, is for processing the character image data in such a manner that, of the character image data that has been stored in the second character image data storage means, a character image that has been specified by the character specifying data and has a font that has been specified by the font specifying data will be enlarged or reduced so as to take on a size that has been designated by the size designating data.

Image data representing a character image of a designated size can thus be obtained without sending or receiving character image data between the client computer and server. This makes it possible to lower cost.

It is preferred that the client computer further include font preview data storage determination means (a

font preview data storage determination data) for determining whether font preview data, which is for displaying a representative character having a font specified by the font specifying data, has been stored;

5 display control means for controlling a display device so as to display, on a display screen, the representative character represented by the font preview data in response to a determination by the font preview data storage determination means that the font preview data has been stored; and means (a transmitting device)  
10 for transmitting a font preview data transmission request to the server in response to a determination by the font preview data storage determination means that the font preview data has not been stored; and that the  
15 server include font preview data transmitting means for transmitting the font preview data to the client computer in response to the font preview data transmission request transmitted from the client computer.

20 Thus, a font possessed by a character represented by received character image data can be viewed by the user of the client computer in advance.

Further, the transmitting means of the client computer transmits, to the server, character string  
25 specifying data for specifying a combination of a plurality of characters constructing a character string, and font specifying data for specifying the fonts of the characters constructing the character string. The



receiving means of the server receives the character string data and the font specifying data transmitted from the transmitting means. The retrieval means of the server retrieves, from the first character image data storage means, character image data expressing characters as images, wherein each of these characters, which construct the character string specified by the character string data, and has a font that has been specified by the font specifying data.

10 In this case a character string composed of a plurality of characters can be obtained by the character image data received at the client computer.

Further, the client computer may further include style data transmitting means (a style data transmitting device) for transmitting, to the server, character style designating data for designating style of a character specified by the character specifying data. The server may include designated character-style retrieval means (a designated character style retrieval device) for retrieving, from the first character image data storage means, designated-style character image data expressing, as an image, a character of a style designated by the character style designating data transmitted from the style data transmitting means; designated-style character image data generating means (a designated-style character image data generating device) for generating the designated-style character image data in response to a situation where the designated-style

character image data is not found by the designated character-style retrieval means; and designated-style character image data transmitting means (a designated-style character image data transmitting device) for transmitting, to the client computer, the designated-style character image data generated by the designated-style character image data generating means or the designated-style character image data found by the designated character-style retrieval means.

10        Since the client computer receives the character image data and the designated-style character image data, it is possible to obtain not only a character image having a designated style (bold, italic, shadow, outline, embossed, engraved, superscript, subscript, etc.) but also character images having styles other than the designated styles represented by the character image data. It is easy to generate a character image of another style from character image data of a style other than a designated style.

20        Furthermore, the server may include style information transmitting means (a style information transmitting device) for transmitting, to the client computer, style information for generating the designated-style character image data, and the client computer may further include means (a generating device) for generating the designated-style character image data based upon the style information and the character image data transmitted from the style information transmitting

means.

Thus, it is possible for the client computer to generate the designated-style character image data representing the character image of a designated style  
5 from the style information and character image data.

The client computer may further include character image data storage means (a character image data storage device) for storing the character image data transmitted from the character image data transmitting means.

10 The server may further include a printing device and means (a generating device) for generating new character image data, from the character image data that has been designated by the character image data generating means, so as to obtain a character image  
15 having a resolution suited to the resolution of the printing device.

If the printing device possessed by the server has a resolution higher than that of a printing device possessed by the client computer, it can print a  
20 character image whose resolution is higher than that of a character image printed by the printing device of the client computer. The character image that has been printed would be sent from the operator of the server to the user of the client computer by mail or the like.

25 The present invention further provides a recording medium storing a program for controlling the above-mentioned client computer and a recording medium storing a program for controlling the above-mentioned server.

Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which like reference characters designate  
5 the same or similar parts throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates the essential components of a font sharing system;

10 Fig. 2 illustrates the electrical construction of a client computer;

Fig. 3 illustrates the electrical construction of a server;

Fig. 4 illustrates a model of an advertisement;

15 Fig. 5 shows the advertisement;

Fig. 6 is a flowchart showing a processing procedure for creating an advertisement;

Fig. 7 illustrates a client computer and a server;

Fig. 8 shows a text editing window;

20 Fig. 9 shows a layout information file;

Figs. 10a and 10b show layout information files;

Fig. 11 illustrates a file of default text attributes;

Fig. 12 shows a font ID table;

25 Figs. 13a and 13b show a bitmap text file;

Fig. 14 shows an example of character images displayed in a text area;

Fig. 15 shows a bitmap font file;

A user employs the client computer 1 to create an advertisement. When the font of a character used in the

advertisement has not been stored in the client computer 1, character image data (a bitmap text file, described later) expressing this character as an image is transmitted from the server 30 to the client computer 1.

5 The advertisement is then created at the client computer 1 using the character expressed by the character image data that has been received. The advertisement is printed by the client printer 21 connected to the client computer 1, or advertisement creating data representing  
10 the advertisement is transmitted from the client computer 1 to the server 30 and the advertisement is printed by the server printer 31 connected to the server 30.

Fig. 2 is a block diagram showing the electrical  
15 construction of the client computer 1.

The overall operation of the client computer 1 is supervised by a CPU 11.

Connected to the client computer 1 are a modem 2 for through which the computer communicates data with  
20 the server 30, a floppy disk (FD) drive 3 for recording data on a floppy disk and reading data that has been recorded on the floppy disk, a compact disk read-only memory (CD-ROM) drive 4 for reading data that has been recorded on a CD-ROM, a mouse 5 and a keyboard 6. Data  
25 obtained from these devices 2 to 6 is loaded into the client computer 1 via a system I/O controller 7.

A program for creating an advertisement has been stored on a CD-ROM and is read by the CD-ROM drive 4 so

as to be installed in the client computer 1.

The client computer 1 includes a bus controller 8,  
a RAM 9 for storing data temporarily and a ROM 10 for  
storing programs and other data that is necessary. A  
5 hard disk drive 13 is connected to the client computer 1  
via an external I/O controller 12. Data is written to a  
hard disk (not shown) and data that has been recorded on  
the hard disk is read out by the hard disk drive 13.

A layout information file, a font ID table, a  
10 bitmap text file, a bitmap font file and a layout  
preview file, which will be described later, are  
recorded on the hard disk.

The client computer 1 further includes an interrupt  
controller 14, a timer 15, a memory controller 16 and a  
15 VRAM 17 for storing image data temporarily in order to  
display an image on a display device 19. Image data  
that has been recorded in the VRAM 17 is converted to an  
analog video signal by being applied to a digital/analog  
converter 18. The analog video signal is applied to the  
20 display device 19, whereby the image is displayed on the  
display screen of the display device 19.

The client printer 21 connected to the client  
computer 1 is controlled by a printer control circuit  
20.

25 Fig. 3 is a block diagram showing the electrical  
construction of the server 30.

The server 30 has a construction identical with  
that of the client computer 1. The circuits

constructing the server 30 that are the same as those  
constructing the client computer 1 are identified by  
like reference characters and need not be described  
again. The server 30 differs from the client computer 1  
5 in that the high-resolution server printer 31 is  
connected thereto, as mentioned earlier.

Fig. 4 illustrates a model for the purpose of  
creating an advertisement.

Areas A1 to A5 are formed in the model of the  
10 advertisement. An illustration represented by image  
data is pasted in the area A1, character images of the  
name of a business establishment represented by  
character image data are pasted in the area A2,  
character images of an introductory passage represented  
15 by character image data is pasted in the area A3, a map  
represented by image data is pasted in the area A4, and  
character images of an address and business hours  
represented by character image data are pasted in the  
area A5. The areas A2, A3 and A5 in which the character  
20 images (characters in the form of images expressed by  
the character image data) are pasted shall be referred  
to as text pasting areas, and the areas A1 and A4 in  
which pictures (images) are pasted shall be referred to  
as image pasting areas.

25 An advertisement of the kind shown in Fig. 5 is  
created by pasting illustrations and the like in the  
areas of the model depicted in Fig. 4.

Fig. 6 is a flowchart showing a processing



procedure for creating an advertisement.

The user first creates the advertisement model shown in Fig. 4. When the model shown in Fig. 4 is created by the user, areas for pasting pictures or  
5 character images are selected from among the areas A1 to A5 in the created model (step 91).

If a selected area is area A1 or A4 in which a picture is pasted (step 92), an image file (which has been stored on the hard disk) containing the image data  
10 expressing the pasted picture is designated (step 93). When the image file is designated, the image expressed by the image data that has been stored in this image file is pasted in the designated area A1 or A4 (step 94). It goes without saying that the image may be  
15 enlarged or reduced in size in dependence upon the size of the area.

If the selected area is area A2, A3 or A5 for pasting the character images (step 95), text editing processing is executed (step 96). In text editing  
20 processing, data is communicated with the server 30 and the server 30 generates character image data (step 111). This text editing processing, which will be described later, provides character image data that expresses characters and images. The character images expressed  
25 by the character image data are pasted in the selected area A2, A3 or A5 (step 97).

The processing of steps 91 to 97 is repeated until the pasting of pictures or character images in all areas

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A1 to A5 of the model created beforehand is completed ("YES" at step 98).

Next, whether the advertisement is to be printed by the client printer 21 connected to the client computer 1 or by the server printer 31 connected to the server 30 is decided by the user of the client computer 1 (step 99). In a case where the advertisement is to be printed using the client printer 21, the data for creating the advertisement is applied to the client printer 21 and is printed thereby (step 100). If the advertisement is to be printed using the server printer 31 connected to the server 30, the data for creating the advertisement is transmitted from the client computer 1 to the server 30 (step 102). If the data for creating the advertisement is received, high-resolution character image data is generated at the server 30 to create a high-resolution advertisement (step 112) and advertisement creating data which supports the resolution of the server printer 31 is generated again (step 113).

The advertisement creating data thus regenerated is applied to the server printer 31 of the server 30 and the high-resolution advertisement is printed thereby (step 114). When the advertisement has been printed, the printed advertisement is mailed to the user of the client computer 1 by the operator of the server 30 (step 115).

Text editing processing (the processing of step 96 in Fig. 6) will be described next. Here a case where

character images are pasted in the areas shown in Figs. 4 and 5 will be described.

When the advertisement model is created and an area (here the area A2) in which character images are pasted is selected in the manner described above, control proceeds to the text editing processing.

Fig. 7 illustrates the relationship between the client computer 1 and the server 30.

In text editing processing, a layout information file (see Figs. 9, 10a, 10b) is created by the user of the client computer 1. The created layout information file is transmitted from the client computer 1 to the server 30.

On the basis of the layout information file, the server 30 creates a bitmap text file (see Figs. 13a, 13b) in which character image data has been stored. The created bitmap text file is transmitted from the server 30 to the client computer 1.

Upon receiving the bitmap text file, the client computer 1 reads out the character image data that has been stored in the bitmap text file. The character images expressed by the character image data that has been read out are pasted in the area A2.

Further details of text editing processing will become apparent from the description that follows.

First, a text editing window shown in Fig. 8 is displayed on the display screen of the display device 19 of the client computer 1.

The text editing window includes an area A11 for selecting the font of a character image to be pasted in an area; an area A12 which displays the size of a character image to be pasted in an area; an area A13 for selecting the size of this character image; an area A14 for designating the style of a character image (in this embodiment, bold, italic, superscript, subscript, shadow and outline can be designated as character styles); a font preview area A15 for displaying, in regard to representative characters, the font that has been designated by the font selection area A11; a text input display area A16 which displays characters entered by the user of the client computer 1; a preview area A17 in which the layout of characters to be pasted in an area is displayed by frames in accordance with the sizes of the characters, and which is for previewing character images; an area A18 clicked on by the user of the client computer 1 when frames are displayed in the preview area A17; an area A19 clicked on by the user of the client computer 1 when character image data expressing character images is downloaded from the server 30; an area A21 clicked on by the user of the client computer 1 when character images are finally pasted in a selected area of the model; and an area A22 clicked by the user of the client computer 1 when the user wishes to cancel an entry. It goes without saying that a return key on the keyboard 6 is pressed when a new line is started in the text input display area A16.

Fig. 9 illustrates the format of the layout information file created by the user of the client computer 1.

5       The layout information file includes a text area  
size recording area which stores data representing the  
size of an area selected by the user; a character count  
recording area which stores data representing the number  
of characters of character images entered in a text  
pasting area selected by the user (in a case where the  
10   return key is pressed, this event is counted as one  
word); and a text area for storing data representing a  
character to be entered in an area.

The layout information file further includes a text attribute area and a character attribute list area.

15       The text attribute area includes areas for storing  
data representing the alignment of entered text (whether  
a character string is to be centered, justified left or  
justified right), character spacing, line spacing, a  
list of characters forbidden at the beginning of a line  
20   (e.g., a punctuation mark), and a list of characters  
forbidden at the end of a line (e.g., a left  
parenthesis). Data that is stored in the text attribute  
area may be determined in advance in the manner shown in  
Fig. 11.

25       The character attribute list includes a font  
attribute area, a size attribute area and a style  
attribute area.

The font attribute area is an area for storing font

IDs which designate the fonts of entered characters. A font ID table of the kind shown in Fig. 12 is stored in the client computer 1 and server 30 beforehand. The font of a character image is specified by specifying the font ID. The size attribute area is an area for storing data which designates the size of an entered character. The style attribute area is an area for storing data which designates the style of an entered character. These items of data are stored in the respective areas in correspondence with the entered characters.

Figs. 10a and 10b illustrate the manner in which the data has been stored in the layout information file. Fig. 10a shows the initial state. Here data has been stored only in the text area size and text attribute area. Fig. 10b illustrates the final state, in which data has been stored.

In the example shown in Fig. 10b, the nine words "Den European-style Beer Restaurant DEN" have been entered in the selected text information area A2. The return key has been pressed between "Den" and "European-style Beer Restaurant" and between "European-style Beer Restaurant" and "DEN" to start new lines. A font (Fujimaru Comic; see Fig. 12) represented by "FC0023" has been designated for the first word (Den), a font (Fujimaru Block; see Fig. 12) represented by "FK001" has been designated for the next three words (European-style Beer Restaurant), and a font (Fujimaru Gothic; see Fig. 12) represented by "FG002" has been designated for the

last word (DEN). A size represented by "84" has been designated for the first word, a size represented by "32" has been designated for the next three words, and a size represented by "54" has been designated for the last word. In the example shown in Fig. 10b, a style has not been designated in regard to any of the entered characters.

This layout information file is generated in text editing processing by the user of the client computer 1 and is recorded on the hard disk of the client computer 1.

Fig. 13a shows the format of a bitmap text file generated at the server 30, and Fig. 13b illustrates a bitmap text file in which specific data has been stored.

The bitmap text file includes an area (text area size) for storing data which represents the size (represented by number of pixels in the vertical direction and number of pixels in the horizontal direction) of a selected text pasting area; an area (display bitmap image) for storing character image data expressing character images to be pasted to the size of the selected text pasting area; an area (word count) for storing data which represents the number of characters constructing character images to be pasted in a selected text pasting area; an area (line count) for storing data which represents the number of lines of characters constructing character images to be pasted in a selected text pasting area; and a text recording area (text) for

storing data which represents characters entered by the user.

The bitmap file further includes a text attribute area and a character attribute list area similar to  
5 those of the layout information file.

Data stored in the text attribute area is the same as data stored in the above-mentioned layout information file and need not be described again. Data stored in the text attribute area is copied from the data that has  
10 been stored in the layout information file.

The character attribute list area includes, in addition to the font attribute area, size attribute area and style attribute area contained in the layout information file, a baseline attribute area, an  
15 arrangement attribute area, an area attribute area and an original attribute area. Data stored in the font attribute area, size attribute area and style attribute area is the same as the data stored in the layout information file and need not be described again. Data  
20 stored in the font attribute area, size attribute area and style attribute area of the bitmap text file is copied from the data that has been stored in the layout information file.

Data stored in the baseline attribute area,  
25 arrangement attribute area and area attribute area is data representing the pasting position of characters pasted as images of a selected text area and data stipulating the sizes of characters.



Fig. 14 shows the selected text pasting area A2. Character images appear in this text pasting area at the pasting positions.

Data stored in the baseline attribute area

5 represents, on a per-line basis, reference positions below the characters constructing the character images pasted in the text pasting area that has been selected. Since character images spanning three lines are pasted in the selected text pasting area in this embodiment,

10 each of the items of data representing the reference positions of the three lines is stored in the baseline attribute area. By taking the point at the upper left of a text area as the origin (0,0), a reference position is expressed by the number of pixels from the origin in

15 the vertical (Y) direction. For example, the characters constituting the first line are regulated in such a manner that the baseline of the characters will be situated at a position that is 92 pixels distant from the origin in the vertical direction. The characters

20 constituting the second line are regulated in such a manner that the baseline of the characters is situated at a position that is 120 pixels distant from the origin in the vertical direction. The characters constituting the third line are regulated in such a manner that the

25 baseline of the characters is situated at a position that is 180 pixels distant from the origin in the vertical direction.

Data stored in the arrangement attribute area

indicates the positions of the characters constructing the character images pasted in the text pasting area that has been selected. In a case where each character is enclosed by a frame corresponding to the size of the character, the position of the character is indicated by the position (number of pixels in the x direction and number of pixels in the y direction) of the point at the upper left of the frame. For example, by taking the point at the upper left of the text pasting area as the origin (0,0), the position of the character "D" among the character images pasted in the selected text area is regulated in such a manner that the point at the upper left of the frame will be situated at the position (161,18). If the character is the character "e", its position is regulated in such a manner that the point at the upper left of the frame will be situated at the position (225,32).

Data stored in the area attribute area indicates the size of each character constructing character images pasted in the text area. In a case where each character is enclosed by a frame corresponding to the size of the character, size is indicated by the horizontal width and vertical length of the frame. For example, if the character among the character images pasted in the selected text area is the character "D", size is stipulated by a horizontal width of 64 (= 225 - 161) pixels and a vertical length of 74 (= 92 - 18) pixels.

When a style designating flag for style designation

has been stored in the style attribute area so as to obtain a prescribed style, data expressing a character image of a style represented by the data that has been stored in this style attribute area is stored in the display bitmap image area. However, if the client computer 1 possesses image data representing not only character images of specific styles but also character images having standard styles (the Ming-style typeface, Gothic typeface, etc.), a character image having a style different from that of the standard character image can be generated with relative ease from the image data expressing the standard character image. To accomplish this, in a case where a style designation has been made by the user of the client computer 1, image data representing the standard image, in addition to the image data representing the image of the designated style, is transmitted from the server 30 to the client computer 1 as original image data. The area which stores the original image data is the original attribute area.

This bitmap text file is generated by the server 30.

Fig. 15 illustrates the format of a bitmap font file.

The bitmap font file is generated from the bitmap text file.

The bitmap font file includes a display bitmap image area, a text recording area and a character

attribute area. Data representing the font ID, data  
representing size, data representing a style flag and  
data representing a baseline is stored in the character  
attribute area. Further, when data representing an  
5 original image is present, the data representing this  
original image is stored as well.

Fig. 16 illustrates the format of the layout  
preview file.

The layout preview file indicates the layout in the  
10 preview area A17 shown in Fig. 8. This layout preview  
file is generated from the bitmap text file transmitted  
from the server 30.

The layout preview file includes a text area size  
recording area, a word count recording area, a line  
15 count recording area, a text recording area and a  
character attribute list area. The character attribute  
list includes a baseline attribute area, an arrangement  
attribute area and an area attribute area.

Figs. 17 to 19 are flowcharts illustrating the  
20 procedure of text editing processing (the processing of  
step 96 in Fig. 6).

First, a request of a list of font names is  
transmitted from the client computer 1 to the server 30  
(step 41).

25 Upon receiving the request for the list of font  
names from the client computer 1, the server 30 responds  
by transmitting data representing the list of font names  
to the client computer 1 (step 71). When data

representing the list of font names has already been stored in the client computer 1, the processing of steps 41 and 71 is skipped.

Upon receiving the data representing the list of  
5 font names, the client computer 1 displays the font names as a list in the area A11 based upon the data received. The user of the client computer 1 selects the desired font from the fonts displayed in the area A11 (step 42).

10 It is determined whether font preview data which appears in regard to a typical character having a selected font has been stored on the hard disk of the client computer 1 (steps 43, 44).

If font preview data corresponding to the selected  
15 font has not been stored on the hard disk of the client computer 1 ("NO" at step 44), then a request for the font preview data is transmitted from the client computer 1 to the server 30 (step 45).

Upon receiving the request for the font preview  
20 data transmitted from the client computer 1, the server 30 responds by transmitting the corresponding font preview data from the server 30 to the client computer 1 (step 72).

Upon receiving the font preview data transmitted  
25 from the server 30, the client computer 1 records this data on the hard disk (step 46).

In any case, the font represented by the font preview data is displayed in the area A15. The user of

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the client computer 1 views the displayed font and, if it is acceptable, control proceeds to the next processing step. If the font is not acceptable to the user, then processing is repeated from step 42 ("NO" at  
5 step 47).

A character (character string) to be displayed in the selected text pasting area is entered using the keyboard 6 of the client computer 1. When the character is entered, the entered character is displayed in the  
10 text input display area A16. Further, the size of each entered character is selected from the sizes displayed in the area A13. The size selected is displayed in the area A12. If necessary, a style being displayed in the area A14 is designated. The box to the left of the  
15 designated style is checked (step 48 in Fig. 18). As a result of these operations, the layout information file (see Figs. 8, 9a and 9b) is created.

When text is thus entered, control shifts to layout preview processing or character image display  
20 processing.

If the area A18 is clicked on by the user of the client computer 1, control proceeds to layout preview processing (step 49). If the area A19 is clicked on by the user of the client computer 1, then control proceeds  
25 to character image display processing (step 56).

A case where the area A18 is clicked on to shift to layout preview processing will be described first.

When control proceeds to layout preview processing,

first reference is had to the bitmap font file that has been recorded on the hard disk (step 50). It is determined whether all of the character image data expressing characters having fonts, sizes and styles  
5 designated by the user and that has been entered by the user has been stored in the bitmap font file recorded on the hard disk (step 51).

If there is character image data that has not been stored in the bitmap font file, the layout information  
10 file that was generated by the character input processing of step 48 and a request for preview information are transmitted from the client computer 1 to the server 30 (step 52).

Upon receiving the layout information file and  
15 preview information request from the client computer 1, the server 30 analyzes the layout information file that has been received (step 73 in Fig. 19). It is determined, in conformity with the results of analysis, whether a bitmap font file corresponding to the received  
20 layout information file has been recorded on the hard disk of the server 30 (step 75).

If a corresponding bitmap font file has not been recorded on the hard disk of the server 30, the corresponding bitmap file is generated based upon the  
25 received layout information (step 76). The generated bitmap font file is recorded on the hard disk of the server 30 (step 77).

A bitmap text file also is generated (step 78).

Since a request for transmission of the layout preview information has been issued in this case ("YES" at step 79), the layout preview file is generated and the generated layout preview file is transmitted from the server 30 to the client computer 1 (step 81).

Upon receiving the layout preview file transmitted from the server 30 (step 53 in Fig. 18), the client computer 1 generates data for display in the layout area A17 based upon the bitmap font file recorded on the hard disk of the client computer 1 or layout preview file transmitted from the server 30 (step 54). On the basis of the generated data, frames the number of which agrees with the number of entered characters and which have the sizes of the character sizes set by the user of the client computer 1 are displayed (step 55; see area A17 in Fig. 8).

Since frames conforming to the set sizes are displayed in the preview area A17 in a number corresponding to the number of entered characters, the user can tell what appearance the entered text will have when it is displayed. Of course, when a bitmap file of each character constituting text entered by the user of the client computer 1 has been recorded on the hard disk of the client computer 1, the characters may be displayed in the preview area A17 using the designated fonts, as shown in Fig. 20, without displaying frames.

Character image display processing will be displayed next.



If the area A19 is clicked on by the user of the client computer 1, control shifts to character image display processing (step 56 in Fig. 18).

Reference is had to the bitmap font file that has  
5 been recorded on the hard disk of the client computer 1  
(step 57). It is determined whether all of the  
character image data expressing characters having fonts,  
sizes and styles designated by the user and that  
constitutes text that has been entered by the user has  
10 been stored in the bitmap font file recorded on the hard  
disk (step 58).

If there is character image data that has not been  
stored in the bitmap font file, the layout information  
file that was generated by the character input  
15 processing of step 48 and a request for a bitmap text  
file are transmitted from the client computer 1 to the  
server 30 (step 59).

Upon receiving the layout information file and  
request for the bitmap text file from the client  
20 computer 1, the server 30 analyzes the layout  
information file that has been received (step 73 in Fig.  
19). It is determined, in conformity with the results  
of analysis, whether a bitmap font file corresponding to  
the received layout information file has been recorded  
25 on the hard disk of the server 30 (step 75).

If a corresponding bitmap font file has not been  
recorded on the hard disk of the server 30, the  
corresponding bitmap file is generated based upon the

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received layout information (step 76). The generated bitmap font file is recorded on the hard disk of the server 30 (step 77).

5 A bitmap text file also is generated (step 78). If generation of the bitmap text file at the layout preview processing has been completed, then the processing of step 78 is skipped, as a matter of course.

10 Since a request for transmission of the bitmap text file has been issued in this case ("NO" at step 79), the bitmap text file is generated and then transmitted from the server 30 to the client computer 1 (step 80).

15 The bitmap text file transmitted from the server 30 is received by the client computer 1 (step 61). The bitmap text file that has been received is recorded anew on the hard disk of the client computer 1 (step 62). If all bitmap fonts are already on the hard disk of the client computer 1 ("YES" at step 58), then the client computer 1 generates the bitmap text file based upon the bitmap font file.

20 In any case, characters having fonts set by the user of the client computer 1 are displayed in the preview area A17 at the designated sizes and in the designated styles (step 63). The user of the client computer 1 views the character images and, if they are  
25 acceptable, clicks on the area A21 ("YES" at step 64). As a result, the character images displayed in the preview area are pasted in the selected text area (step 65).

Though a line boundary character check (Japanese hyphenation) has not been designated in the above-described processing, such processing may be designated if desired.

5        Fig. 21 shows the appearance of text in a case a line boundary character check (Japanese hyphenation) has not been designated. If this processing has not been designated, characters are displayed in accordance with the character order regardless of the types of symbols  
10        used. As a consequence, occasions arise in which a punctuation mark appears at the beginning of a line or a left parenthesis appears at the end of a line. Characters one does not wish to appear at the beginning of a line are stored in the list (located in the layout  
15        information file) of characters forbidden at the beginning of a line, and characters one does not wish to appear at the end of a line are stored in the list (located in the layout information file) of characters forbidden at the end of a line. In a case where a  
20        character contained in these lists appears at the beginning or end of a line, a line boundary character check, such as narrowing or widening the spacing between characters, is executed. A character in the list of  
25        characters forbidden at the beginning of a line is thus prevented from appearing at the beginning of a line, and a character in the list of characters forbidden at the end of a line is prevented from appearing at the end of a line.

Figs. 22a, 22b and 22c illustrate examples of text entered in the text area.

In a case where the size of characters set by the user of the client computer 1 is too large, not all of  
5 the characters will fit in the text area, as shown in Fig. 22a. In this case data is communicated between the client computer 1 and server 30 and the characters are reduced in size until they fit within the text area.

However, this is disadvantageous in that sending  
10 and receiving data between the client computer 1 and server 30 a number of times results in higher communication costs. Accordingly, an arrangement may be adopted in which character images of a size commensurate with the text area are obtained by reducing or enlarging  
15 the character images represented by the display bitmap images of the bitmap text file stored on the hard disk of the client computer 1. The reduction or enlargement processing would be executed by the CPU 11 of the client computer 1.

20 Furthermore, rather than merely changing the style of each character constituting a character image, character ornamentation processing for changing the shape of the entire character image (character string) may be executed. In this case, a character  
25 ornamentation selection window of the kind shown in Fig. 23 is displayed on the display screen of the display device 19 of the client computer 1 when character image display processing is executed at the client computer 1.

Here the user is allowed to select the desired character ornamentation. The data representing the selected character ornamentation is transmitted from the client computer 1 to the server 30.

5        Upon receiving the character ornamentation, the server 30 subjects the character image to character ornamentation processing based upon the data representing the character ornamentation that has been designated. Data representing the character image that  
10    has undergone character ornamentation processing is transmitted from the server 30 to the client computer 1. In this case also it goes without saying that data expressing a standard character image is transmitted from the server 30 to the client computer 1 and not just  
15    the character image that has been ornamented. Of course, the data expressing the standard character image need not necessarily be transmitted from the server 30 to the client computer 1

Fig. 24 illustrates an example of character strings  
20    whose characters have been ornamented.

As many apparently widely different embodiments of the present invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific  
25    embodiments thereof except as defined in the appended claims.